

ORIGINAL RESEARCH

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Evaluation of efficacy of oral honey use in adult tonsillectomy patients**¹Muge Ozcelik Korkmaz¹, Mehmet Guven¹, Unal Erkorkmaz²**¹*Sakarya University Medical Faculty, Department of Otolaryngology, Sakarya, Turkey*²*Sakarya University Medical Faculty, Department of Bioistatstic, Sakarya, Turkey*

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Abstract

Post-tonsillectomy throat pain is one of the most common complication, which leading to delayed recovery and later hospital discharge. This study aims to evaluate the effectiveness of oral honey use on eating, condition and reducing pain with patients have applied tonsillectomy. The study included 72 patients (37 males, 35 females; mean age 26±4.16 years; range 18 to 36 years) who were applied tonsillectomy. Patients were randomized into two groups. The treatment group received postoperatively followed by oral consumption of honey three times daily for five days. Patients' pain, eating and condition situation was assessed with visual analog scale (VAS), and analgesic intake was recorded during five follow-up periods. There was no statistically different between two groups about postoperative pain at first three days. But the postoperative pain was statically significant less at honey group than the control group. There was also a significant decrease in the number of analgesics taken over the last three control periods in terms of the honey group. The eating situation was statically significant better in the honey group than the control group at all days. The patients' condition was also better in the honey group at all days. The result of study, the early postoperative pain was relieved slightly faster in the honey + antibiotic group, which may be attributed to the soothing effect of honey. This situation improves the oral intake of the patients and shortens the recovery process in the postoperative period.

Keywords: Tonsillectomy, pain, honey, condition**Introduction**

Tonsillectomy is one of the most frequently performed surgical operations in the world and is frequently performed due to recurrent infection and upper respiratory tract obstruction indications. Although it is a simple surgical procedure, there is a high incidence of complications during the perioperative and postoperative period. Bleeding, pain, infection, delayed wound healing, velopharyngeal insufficiency, nasal regurgitation and otalgia are the most common complications, especially in the postoperative period [1]. Post-tonsillectomy throat pain is more prevalent, especially in the adult age group, and problems such as poor oral intake, general health disorders and delayed recovery time may be expected due to severe pain [2]. Various methods have been proposed for use during and after surgery to reduce pain post-tonsillectomy [3,4]. The most preferred medical treatment option after surgery is acetaminophen or nonsteroidal anti-inflammatory drugs [5]. However, the cause

of nonsteroidal anti-inflammatory drugs increase the likelihood of bleeding and the post-operative use thereof remains controversial.

The biological properties and therapeutic efficacy of honey are a known fact, thus honey has been used as a therapeutic method in many diseases since ancient times. In clinical and experimental studies conducted to explain the therapeutic effects of honey, honey was shown to prevent wound infections, reduce inflammation, and accelerate wound healing [6,7]. Considering the positive effects of honey on wound healing and epithelization, it has been suggested that the use of oral honey may reduce postoperative pain after undergoing a tonsillectomy. Most of the studies conducted for this purpose were carried out on the pediatric age group, and some researchers concluded that honey does not make a significant contribution to reducing pain [8,9]. However, the re-epithelialization process in the adult age group may take longer than in the pediatric age group. This can lead to prolonged pain, difficulty in oral intake, and a decline in quality of life through general health disorders. Therefore, the use of oral honey post-tonsillectomy may accelerate the re-epithelialization process, thus reducing pain in adult patients. However, there is no study to evaluate the positive aspects of honey use only in adult

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tonsillectomy patients

The aim of our study is to assess the effects of the use of oral honey on pain relief, oral intake, and daily quality of life in adult patients after undergoing a tonsillectomy

Material and Methods

A total of 72 patients over 18 years of age who underwent a tonsillectomy with a diagnosis of recurrent/chronic tonsillitis or obstructive sleep apnea were included in our study. The patients were randomized into two groups (such that each group had 36 patients). For the study, approval was obtained from the ethics committee of our medical faculty. All patients were given informed consent. Those with allergies to honey and honey products, allergies to antibiotics of the penicillin group, and those with a known history of chronic disease were not included in the study.

A standard general anesthesia protocol was applied to each patient. The tonsillectomy surgery was performed with the cold dissection method. During the operation, no analgesics were used except for standard paracetamol. Patients in the first group were accepted as the control group and were treated with antibiotics (amoxicillin—clavulanic acid 1000 mg tablets 2x1) and analgesic (paracetamol 500 mg tablets, maximum 5 times/day) after surgery. Additionally, the patients in the study group were recommended to use a teaspoon of honey (produced by Altıparmak Food Industries Group, which is commercially available from Balparmak) 5 times a day for 14 days after the operation. Patients in both groups were told to use the 500 mg paracetamol tablet after discharge only if they felt they needed it, and that they should use it up to 5 times a day. The number of analgesics recorded during the patients stay at the hospital. Patients were asked to keep a record of the number of analgesics they used after the discharge period. All medicines and honey were started after oral intake.

Patients were subjectively evaluated in terms of pain severity, analgesic intake quantity, eating and daily condition using the visual analog scale (VAS). Oropharyngeal examination was also performed at each control period of the patients. The patients were asked to value the pain they felt from 0 (none) to 10 (very severe). Patients were asked to accept pre-operative daily eating and living habits as normal for the assessment of oral intake and daily condition. Accordingly, they were asked to score 0 to 10 on oral intake and daily condition after surgery such that their normal eating and living habits are 10 points. On the first day, the patients were interrogated about pain, oral intake, and daily condition in 2-hour intervals during which they were awake. The averages of the obtained values were taken and recorded as the first-day score. Patients were then called for a check-up on postoperative days 2, 4, 7 and 14 and assessed by being interrogated separately for each indicated category. Additionally, the patients were asked to record the total amount of analgesic tablets they used during this period.

Statistical analysis

Power analyses were performed by referring to similar studies before the number of working groups was calculated[8,9]. Chi-Square test was used to compare the categorical data. Categorical data were shown as counts (n) and percentages (%). Kolmogorov Smirnov normality test was used to check the normality of the continuous data. Mann Whitney U test was used to compare the

parametric continuous data between Honey and Control groups. Friedman test was used to compare the parametric continuous data among 5 control periods. Continuous data were presented as the mean(standard deviation). P values of <0.05 were considered statistically significant. Analyses were performed using commercial software. (IBM SPSS Statistics. Version 23.0. Armonk, NY: IBM Corp.)

Results

Patients Data

A total of 72 patients were included in the study. Of those included in the study, 37 patients (51.3%) were male and 35 patients (48.6%) were female. The mean age of the patients was 26.24 ± 7.81 in the honey group and 26 ± 8.32 in the control group. There was no significant difference between the two groups in terms of the mean age. There was also no significant gender difference between the honey group and the control group. Twenty of the patients in the honey group were male (55.5%) and 16 (44.5%) were female. In the control group, there were 17 male patients (47.3%) and 19 (52.7%) female patients. Additionally, the weight averages of both groups were close to each other. The mean weight values were 67.43 ± 2.83 in the honey group and 70.23 ± 1.1 in control group (Table 1).

Table 1. Demographic Datas Of Patients

	Honey Group (n=36)	Control Group (n=36)	p ¹
Age	26.24 (7.81)	26 (8.32)	>0.05
Gender			
Male	20 (55.5%)	17(47.3%)	>0.05
Female	16 (44.5%)	19(52.7%)	
Weight	67.43±2.83)	70.23 ±1.1)	>0.05

Data were shown as mean (standard deviation) and n (%).

1: Statistical comparison results between Honey and Control groups

Pain score and analgesic intake

There was no statistically significant difference between the pain scores of both groups on the first day when the average pain scores of the patients in both groups were examined ($p > 0.05$). On Days 2, 4, 7 and 14, the average pain scores were significantly lower in the patients using honey than in the control group ($p < 0.05$).

The necessary daily amount of analgesic consumed by the patients was calculated and analyzed from Day 1 to Day 14. Paracetamol was advised to be taken only as needed for both the honey and the control group(max 5 times in a day).

The amount of paracetamol use was different between groups at the last three control period. Average paracetamol consumption amount during the first two control period of study respectively were 3.76 ± 1.49 and 3.48 ± 1.38 in the honey group, compared with 3.82 ± 2.12 and 3.56 ± 1.79 in the control group, which was statistically no significant ($p > 0.05$). However, the pattern of administered analgesic followed a downward trend with the honey group at other control periods. The amount of analgesic used was significantly lower than the control group in the honey group($p < .05$) (Table 2) (Figure 1).

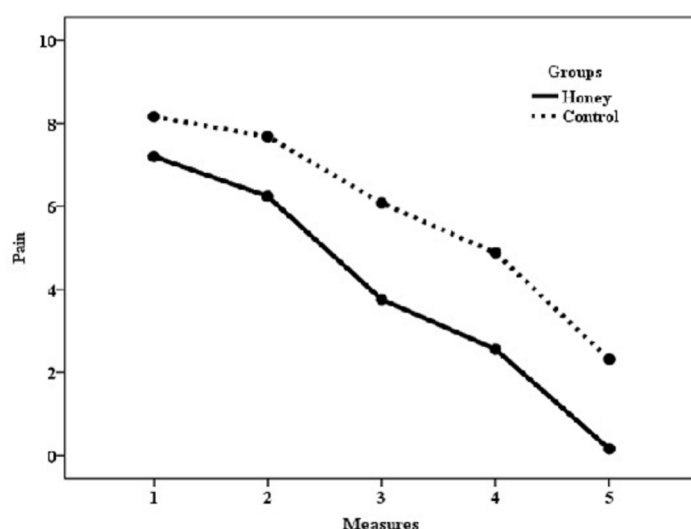
Table 2. Comparation of the patients's pain, analgesic intake, oral intake and daily condition in post-tonsillectomy period

		Honey Group (n=36)	Control Group (n=36)	P-values ¹
Pain	1.	7.2(2.71)	8.16(2.23)	0.189
	2.	6.24(2.11)	7.68(2.06)	0.014
	3	3.76(1.56)	6.08(2.61)	0.001
	4	2.56(1.58)	4.88(2.39)	<0.001
	5	0.16(0.55)	2.32(2.14)	<0.001
	P-values ²	<.001	<.001	
Analgesic Intake	1	3.76(1.49)	3.82(2.12)	0.154
	2	3.48(1.38)	3.56(1.79)	0.064
	3	2.82(1.54)	3.43(1.21)	0.001
	4	2.12(0.64)	3.32(1.32)	0.001
	5	2.09(0.59)	3.28(0.67)	0.001
	P-values ²	<.001	<.001	
Oral Intake	1	4.24(2.11)	2.72(1.9)	0.009
	2	5.52(2.1)	3.44(1.69)	0.001
	3	7.76(1.2)	6.16(1.99)	0.003
	4	8.72(1.28)	7.36(1.7)	0.004
	5	9.6(0.82)	8.72(1.51)	0.015
	P-values ²	<.001	<.001	
Condition	1	4.88(2.32)	3.04(1.54)	0.002
	2	5.92(1.78)	4.08(1.96)	0.002
	3	7.76(1.45)	6.64(1.98)	0.035
	4	8.64(1.38)	7.82(1.63)	0.042
	5	9.76(0.66)	9.04(1.43)	0.024
	P-values ²	<.001	<.001	

Data were shown as mean (standard deviation) and n (%).

1: Statistical comparison results between Honey and Control groups.

2: Statistical comparison results among 5 control periods.

**Figure 1.** Alteration of the pain among five control periods separately for two groups

Oral Intake

The patient's oral intake before surgery was considered normal. When normal oral intake was regarded as 10, the results in the honey group were statistically significantly higher than the control group in each 5 control periods ($p < 0.05$) (Table 2) (Figure 2). This was deemed in favor of honey reducing the level of difficulty in oral intake of the patient after surgery.

Daily Condition

The patient's daily activity level before surgery was considered normal. When normal activity levels were regarded as 10, the results in the honey group were statistically significantly higher than the control group in each 5 control periods ($p < 0.05$) (Table 2)(Figure 3). This was assessed as an increase in the daily condition of patients with honey's effect of alleviating pain and enabling oral intake.

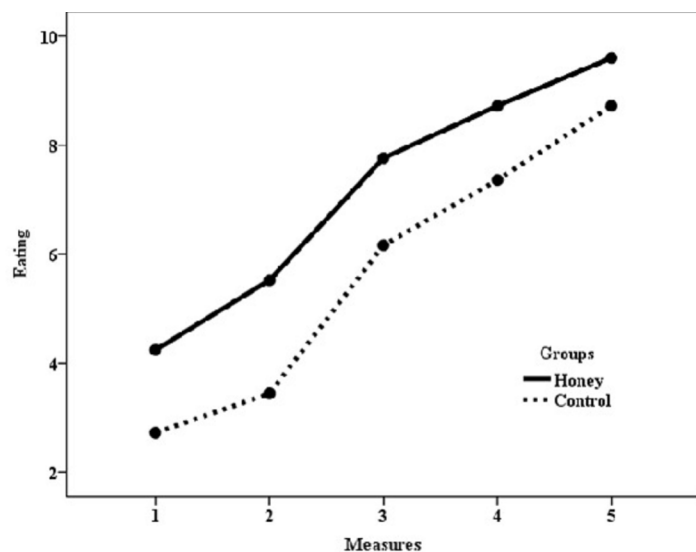


Figure 2. Alteration of oral intake among five control periods separately for two groups

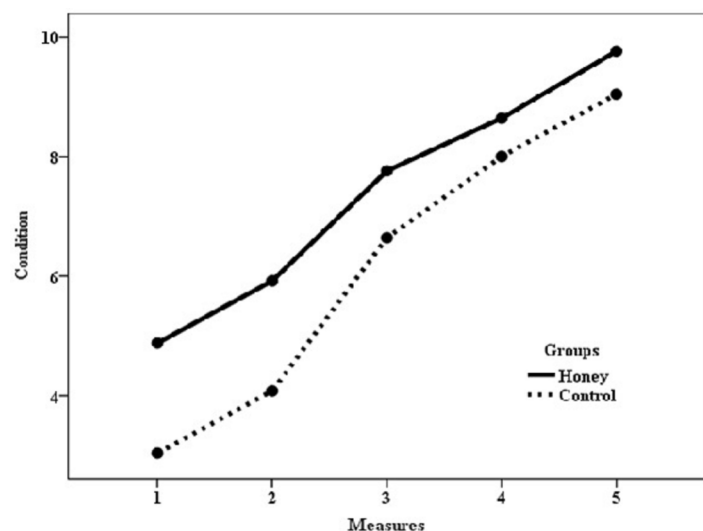


Figure 3. Alteration of condition among five control periods separately for two groups

Discussion

At present, tonsillectomy remains one of the most frequently performed surgical operations in the practice of otorhinolaryngology. The most common complication after tonsillectomy is the postoperative pain [1]. This may lead to severe difficulty of oral intake, limitations in daily activities, and prolongation of the discharge period [2]. The main cause of severe pain following tonsillectomy is mucosal damage, irritation of the glossopharyngeal and vagus open nerve endings. Contractions that develop in the pharyngeal and palatal muscles due to the impact of thermal and mechanical damage which develops in the surrounding tissues are another cause of pain. It is also known that microorganisms forming oral flora may increase throat ache in inflammation and infection caused by tonsillar fossa [8]. Various methods have been developed to be applied during and after surgery to reduce pain. Drugs used for this purpose include steroids, local and systemic analgesics, antibiotics and anti-nausea drugs. The most preferred medical treatment option after surgery is

nonsteroidal anti-inflammatory drugs (NSAIDs). However, these drugs are likely to increase hemorrhage in the postoperative period due to their negative effects on hemostasis [10].

In recent studies, honey has been shown to have antioxidant, antibacterial and anti-inflammatory properties and has therefore been started to be used in many fields of medicine. Honey is known to accelerate wound site epithelization, reduce inflammation, edema and exudation, increase collagen synthesis, and also increase DNA content in granulation tissues. During the healing period, the positive effects of honey on the wound site are due to its acceleration of epithelization and local antibacterial properties [11]. Tonks et al. have shown that honey activates cytokines such as TNF- α , IL-1 β , and IL-6, which lead to the activation of monocytes at a cellular level in their experimental study [12,13]. These mediators also play a role in the regulation of the inflammatory process in wound site healing. TNF- α also has effects on enhancing angiogenesis and fibroblast proliferation [14]. It is indicated that the antibacterial effect of honey is mainly attributed to the osmotic effect produced by its high sugar content (approximately 76%). Furthermore, hydrogen peroxide, nonperoxide organic antibacterial factors and a low pH value (3.5), which are released from glucose by glucose oxidase enzyme activation, are other reasons for the antibacterial properties of honey. All these factors have an effect in inhibiting the growth of many microorganisms [15,16]. Clinical studies have also shown that honey is beneficial in healing chronic wounds, ulcers and graft donor sites, necrotizing fasciitis, treating burns, and neonatal postoperative wound infections [17,18].

It has been suggested that wound site epithelialization accelerating and antibacterial properties of honey may have a positive effect on the improvement of the tonsillar fossa after tonsillectomy. For this purpose, studies have been carried out particularly on pediatric patients to evaluate the effects of honey on pain and epithelization after tonsillectomy. In a study conducted on patients aged 3-18 years, Mat Lazim et al. suggested that the use of oral honey had positive effects on tonsillar fossa epithelization after tonsillectomy [8]. In this study, the healing of tonsillar fossa was seen earlier in patients using honey. However, they had pointed out that the lack of an objective evaluation method that could demonstrate wound site healing could lead to doubt. Letchumanan et al. have shown that the use of oral honey post-tonsillectomy in placebo-controlled trials involving adults and children reduced the rate of pain and accelerated the time to return to school and work after surgery. However, they had pointed out that it did not make a significant difference in wound site epithelialization [7]. Whereas, Ozluedik et al. reported that the mean value of pain and the use of acetaminophen in placebo-controlled clinical trials in which they studied the effects of honey on postoperative pain relief after tonsillectomy were lower in patients using honey in the first two days of study. There was no difference between the two groups after the third day [8]. Whereas, in our study, we concluded that the use of oral honey in adult patients after tonsillectomy was effective in reducing pain, especially after the first day. In addition, the need for using analgesics in patients using honey was significantly lower than the control group after the second control period. This was seen to have positively contributed to patients' oral intake and daily condition. The differences which characterized the working group was to consist only of our study compared to other studies of adult patients.

Although there are studies indicating that honey has positive effects on post-tonsillectomy pain, there are also publications showing there is no difference between a group using honey plus antibiotics and another using only honey after surgery. For instance, Abdullah et al. have indicated that they did not observe honey having a positive effect in reducing pain scores after tonsillectomy outside the early period [19]. This difference in the results of studies may be due to the lack of children's expressions of pain. Visual analog scale evaluation was used to evaluate the level of pain in children in these studies.

We think that our study on the adult age group provides more clarity about the assessment of pain level. Therefore, the optimal interval and time for using honey post-tonsillectomy should still be discussed. In order to increase the positive effects of honey on tonsillar fossa epithelialization, it is argued that the amount in contact with the wound should be increased and that patients need to consume honey at more frequent intervals after surgery for this purpose. However one the limitations of our study is that may support this idea with examination findings. Conducting studies including examination may provide more enlightening data on this subject.

Thus, as a result of other studies, we have concluded that the use of honey in adult tonsillectomy patients will have positive effects, although no consensus has been reached regarding the use of honey for tonsillectomy. This suggests that honey results in showing effectiveness in epithelialization on the tonsillar fossa and in accelerating healing in the postoperative period, especially in adult patients.

Conclusion

The use of oral honey post-tonsillectomy may be effective in reducing postoperative pain in adult patients. Thus, these patients may return to their daily activities and normal eating habits more rapidly in the postoperative period. Future placebo-controlled studies will further support these findings and provide clear information regarding the optimal use of honey.

Competing interests

The authors declare that they have no competing interest.

Financial Disclosure

All authors declare no financial support.

Ethical approval

Consent of ethics was approved by the local ethics committee.

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